

Quantum Dot Spectrometer

Completed Technology Project (2016 - 2017)



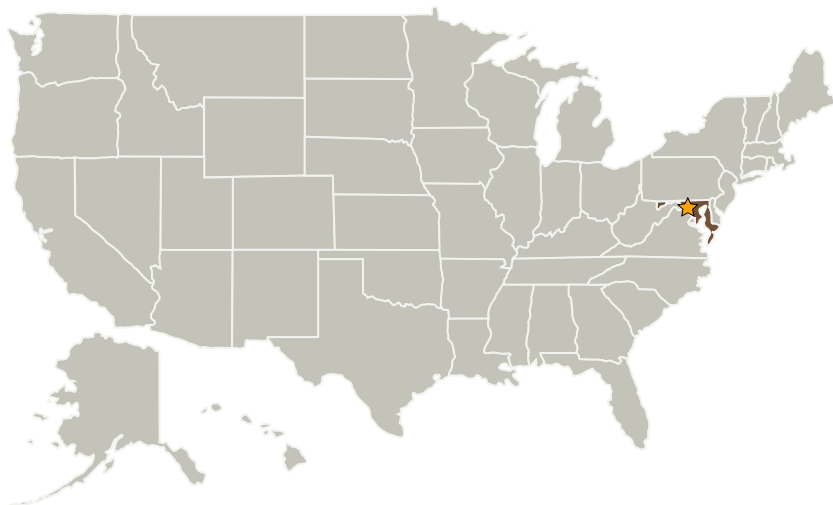
Project Introduction

The main objectives of this CIF are to develop a novel, ultra-compact instrument concept using QDS, qualify QDS through thermal vacuum and vibration tests, and then demonstrate a 20x20 array prototype between the range of 480 to 680 nm. However, the wavelength range can be expanded with more pixels, or a completely different range within 300 to 3000 nm can be achieved by selecting an appropriate set of QDs and detector. The end product of this task will be a preliminary prototype QDS integrated with a detector array, and spectral images produced by the system. As a follow-on effort the PI and team intend to apply to the Advanced Component Technologies program in 2017 to complete the proof-of-concept of the technology and reach a TRL of 3. After that, the team will apply to the Instrument Incubator Program to develop a breadboard and test it in relevant environment, reaching a TRL of 5. At that point, the QDS instrument will be ready to be proposed to Earth Science mission opportunities.

Anticipated Benefits

This second-year effort continues development of a novel, ultra-compact, low mass, and low-cost multispectral imager based on an innovative quantum dot array (QDA) concept. This innovative QDA, based on a recent patent by MIT, acts as an absorptive filter and replaces prisms, gratings, interference filters and other optical components currently used in spectrometers. The advantages of such a Quantum Dot Spectrometer (QDS) make it a suitable instrument for small satellite missions in Earth Science, Heliophysics and Planetary Science.

Primary U.S. Work Locations and Key Partners



Quantum Dot Spectrometer

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	2
Target Destinations	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Innovation Fund: GSFC CIF

Quantum Dot Spectrometer

Completed Technology Project (2016 - 2017)



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Massachusetts Institute of Technology(MIT)	Supporting Organization	Academia	Cambridge, Massachusetts

Primary U.S. Work Locations

Maryland

Project Management

Program Director:

Michael R Lapointe

Program Manager:

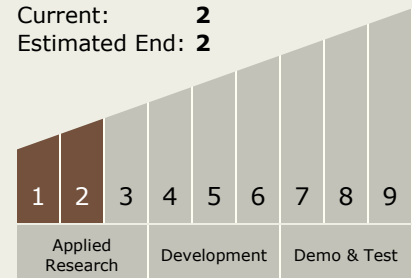
Peter M Hughes

Principal Investigator:

Mahmooda Sultana

Technology Maturity (TRL)

Start: **1**
 Current: **2**
 Estimated End: **2**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - TX08.1 Remote Sensing Instruments/Sensors
 - TX08.1.1 Detectors and Focal Planes

Target Destinations

Earth, Others Inside the Solar System